



## Status of VOC Control Technology ETV Program

March 13, 2002

## Overview of ETV VOC Technology Program



- Assembled VOC Technical Panel (TP)
- First meeting November 27, 2001; reviewed VOC control technology markets & rationale for targeting specific technologies
- Initial focus on bioreaction systems
- Output of 1<sup>st</sup> meeting used to develop draft GVP
- Second TP meeting held on March 7 to review draft GVP

## Market Information



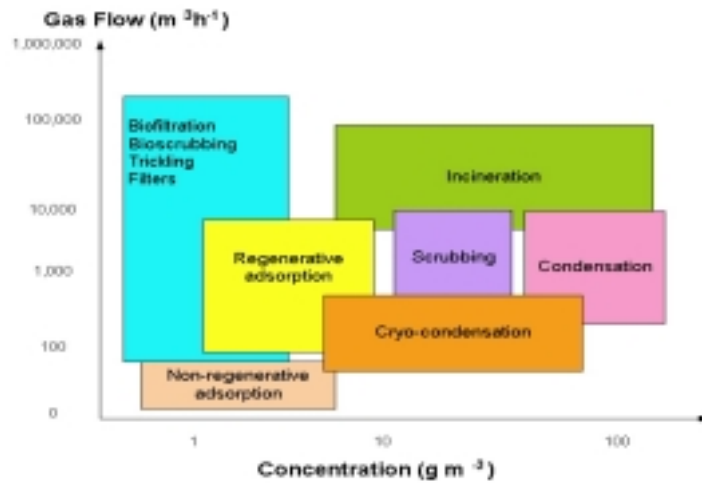
- Markets for VOC Control Technologies Expected to Grow Substantially (1998 projections)
- Growth Driven by CAA Litigation and Regulations such as MACT, RACT, BACT, LEAR, etc.

## Top Markets for VOC Controls (not in order)



- Forest Products Industry  
(Wood Panel Manufacturing)
- Electronics/Semiconductor Manufacturing
- Printing Industry
- Auto Manufacturing  
(Painting Operations)
- Chemical Manufacturing
- Metal Coating and Decorating

## Applicability of Controls Based on Flow Rate and Concentration



## Selecting VOC Technologies for ETV

- Target the Technology:  
Bioreactors, Concentrators, and Plasma technologies
- Technologies are “Innovative & Emerging”

## Initial Focus on Bioreaction Systems



- Technology is in the marketplace though not widely utilized (accepted)
- Industry acceptance expected; some industrial sectors currently using the technology
- Interested technology companies
  - BioReaction Industries
  - VEETech, P.C.

## BIOREACTION SYSTEMS



### Advantages

- Low capital & operating cost
- Effective removal of pollutants
- Good performance at low pollutant concentrations
- Low energy use
- Low maintenance requirements
- Proven technology with reasonable reliability
- Low pressure drop
- No secondary air pollutants (NO<sub>x</sub>)
- Non-toxic secondary waste streams

### Disadvantages

- Efficiency limitations (high-end)
- Efficiency depends on pollutant
- Large footprint requirement
- Inability to treat highly concentrated loads
- Not flexible to extreme changes in loading conditions
- Inability to treat high temperature air streams
- Limited bed life
- Moisture and pH difficult to control

## Scope of Verification Testing



Test performed on bioreaction systems applied to sources of organic air emissions (a.k.a. VOC) to cover two *principal* study questions:

1. What is technology's performance (i.e., VOC removal efficiency and/or VOC emission concentration)?
2. What are the test conditions (range) over which performance is measured?

## Secondary Study Questions



3. What are the associated environmental impacts of operating the technology (e.g., cross-media impacts or by-product air emissions)
4. What are the resources associated with operating the technology (e.g., energy or waste disposal requirements)

## Product to be Tested - Definition of technology



- Bioreaction technology: Any **closed** system that uses microbes (biodegradation) to control a VOC containing gas stream.
- This would include enclosed biofilters, bioreactors, bioscrubbers, biomembrane units, and biotrickling filters.
- Open systems not evaluated using the GVP

## Bioreactor Schematic

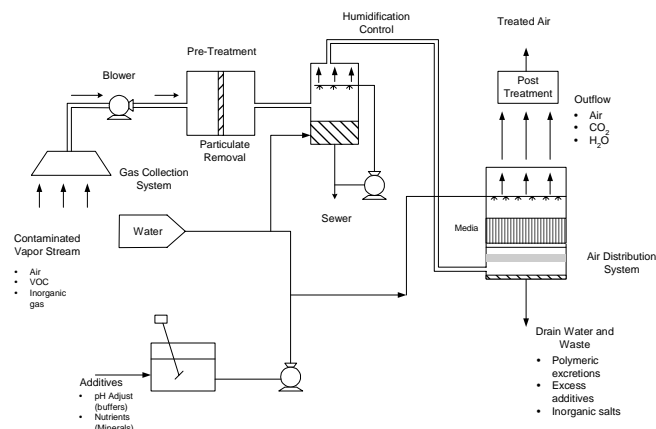


Figure 1. Schematic Diagram of Typical Biofiltration System

## Next Steps



- Revised draft GVP (3/31/02)
- Finalize GVP (approved by 4/30/02)
- Identify candidate technologies for verification testing
- Test/QA Plans (approved by 5/31/02)
- Complete testing arrangements
- Conduct tests (completed by 7/31/02)
- Verification Reports and Statements (signed off by 11/30/02)